Trophic tracers reveal considerable diversity among diets of dominant amphipods from *Posidonia oceanica* seagrass meadows

Michel Loïc[1,2], Dauby Patrick[1], Gobert Sylvie[1], Graeve Martin[3], Thelen Nicolas[1] & Lepoint Gilles[1]

[1]: University of Liège, Belgium. [2]STARESO Research Station, Calvi, France. [3]Alfred Wegener Institute for Polar and Maritime Research, Bremerhaven, Germany.

Contact : loicnmichel@gmail.com - Text freely available alongside other publications at http://tinyurl.com/LMichelPubli

Context

- ***Posidonia oceanica***: endemic Mediterranean seagrass, forms large meadows in coastal zones. **Amphipods** are an essential component of the **vagile fauna** from these meadows (important biomass and biodiversity).
- In other **temperate meadows** (e.g. *Zostera marina*), amphipods play a crucial part in **transfers** of **organic matter** from producers to upper rank consumers. In *Posidonia* meadows, the situation is unclear, since reliable data concerning their trophic ecology are lacking…

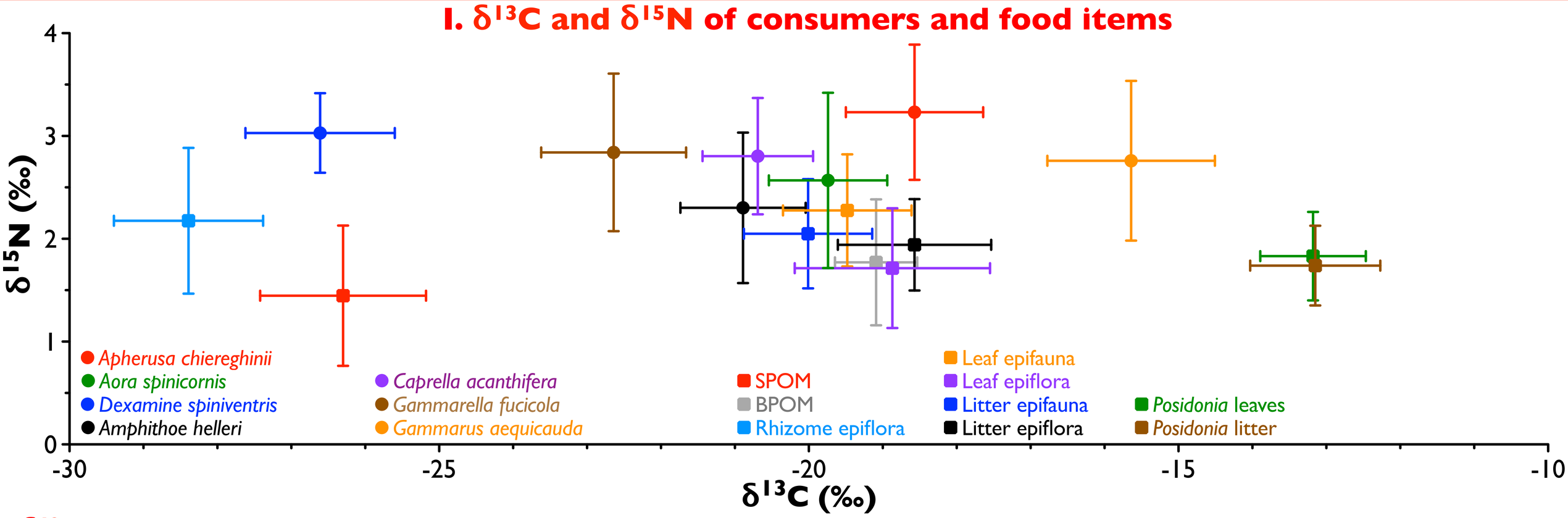
Objectives

1. Estimate relative **importance** of **available food items** for amphipod nutrition: *P. oceanica* leaves and litter; suspended (SPOM) and benthic (BPOM) particulate organic matter; leaf and litter epifauna; leaf, litter and rhizome epiflora.
2. Evaluate the extent of **interspecific trophic diversity** among the taxocenosis.

How? *In situ* sampling of amphipods and food sources in Calvi Bay, at -10 m (42°34'47" N, 8°43'30"E), and during 4 events (06/2008, 11/2008, 03/2009, 07/2009). **Characterization** of the diet of dominant species using 3 techniques: **gut content** examination, determination of the **fatty acid** composition of total lipids, and use of **stable isotopes ratios of C and N**.

Results & Discussion

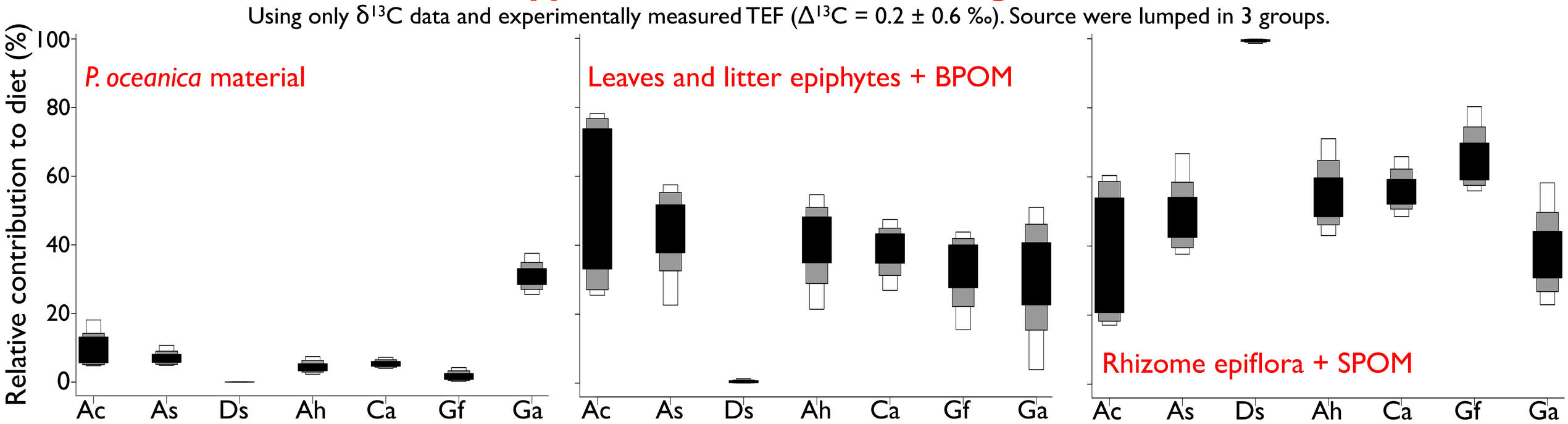
I. $\delta^{13}C$ and $\delta^{15}N$ of consumers and food items



- **$\delta^{13}C$** values : 3 groups of sources. ***D. spiniventris*** mostly feeds on the most negative ones. ***A. chiereghinii***, ***A. spinicornis***, ***A. helleri*** and ***C. acanthifera*** mainly rely on the "median" ones. ***G. fucicola*** and ***G. aequicauda*** seem to forage on two distinct food items groups.
- **$\delta^{15}N$** range of food sources and consumers overlapping: amphipods are **primary consumers** + **low $\Delta^{15}N$**.

II. Application of the SIAR mixing model

Using only $\delta^{13}C$ data and experimentally measured TEF ($\Delta^{13}C$ = 0.2 ± 0.6 ‰). Source were lumped in 3 groups.



- All species but *D. spiniventris* have a **mixed diet** and feed on more than one group of items.
- ***Posidonia*-derived carbon** is important for ***G. aequicauda***.
- **"Most negative" sources** importance seems higher than inferred from descriptive analysis : **major items** for *A. helleri*, *C. acanthifera*, *G. fucicola* and *G. aequicauda*.

III. Insights drawn from other techniques and trophic status of the dominant species

Gut contents: Main food item = macroalgae. No live seagrass grazing, no deposit feeding. Microherbivory or suspension feeding unlikely.

Fatty acids: Plant-based diet (C_{18} and C_{20} PUFA). No live seagrass grazing (low [18:2(n-6)] and [18:3(n-3)]). Diatom marker16:1(n-7) rare.

Overall: *A. chiereghinii* and *A. spinicornis* are grazers focusing mostly on leaf and litter epiphytes. *D. spiniventris* and *G. fucicola* graze preferentially on rhizome epiphytes. *A. helleri* and *C. acanthifera* are generalist epiphyte grazers. *G. aequicauda* is an herbivore/detritivore.

Conclusions

- All species heavily rely on **macroepiphytes** ➔ Potential to have a critical influence on the **ecosystem functioning** through the **grazer-epiphyte-seagrass system.**
- **Interspecific dietary preferences** towards different algal groups and **mixed diets** ➔ Mechanism to avoid competition and maintain **specific diversity**?

Acknowledgements

At the time of the study, LM and NT were respectively F.R.S.-FNRS and FRIA Research Fellows. G. Lepoint is a F.R.S.-FNRS Research Associate. The authors would like to thank Renzo Biondo (Laboratory of Oceanology, ULg) for his technical assistance in the conception and building of sampling gear and the staff of the STARESO Research station for their help during the fieldwork.